

IN THE CLAIMS:

1.-14. (Cancelled)

15. (Currently Amended) In a semiconductor production assembly utilizing a source of fluid, the improvement of a mass flow controller module that can control fluid flow and be installed as a unitary component, comprising:

a housing block member having a fluid passageway connected to the source of fluid; ~~mounted on the housing block member is the~~

a mass flow controller module mounted on the housing block including, from an upstream position in a consecutive and adjacent arrangement, a pressure control valve unit, a flow rate sensor unit and a flow rate control valve unit, said flow rate sensor unit providing a flow rate signal;

a pressure sensor unit is operatively mounted in the fluid passageway, said pressure sensor unit providing a pressure signal; and

a control unit in the mass flow controller module is operatively coupled ~~connected~~ to the pressure control valve unit, the flow rate sensor unit, the flow rate control valve unit and the pressure sensor unit, whereby said pressure sensor unit operatively mounted in the fluid passageway in such close proximity to said flow rate sensor unit that measurement and adjustment of the pressure in said fluid passageway is kept substantially constant at the flow rate sensor unit,

the control unit configured to provide a first control signal to said pressure control valve unit in response to said pressure signal to avoid an effect on the flow rate in the fluid passageway due to a pressure fluctuation at the inlet of the mass flow controller, and

the control unit configured to provide a second control signal to said flow rate control valve in response to said flow rate signal to avoid an effect on the flow rate in the fluid passageway due to a pressure fluctuation at the outlet of the mass flow controller can automatically set and maintain a constant flow rate despite changes in fluid pressure, wherein the housing block member has the fluid passageway with openings to the passageway on an upper surface, the openings including a first annular valve seat for operatively interfacing with a diaphragm member of the pressure control valve unit, a pair of ports for connection to the flow rate sensor unit and a second annular valve seat for operatively interfacing with a diaphragm member of the flow rate control valve and the openings to the fluid passageway are aligned in a row adjacent each other across the housing block member.

16. (Original) The semiconductor assembly of claim 15 wherein a second pressure sensor unit is mounted between the pressure control valve and the flow rate sensor and operatively connected to the control unit.

17. (Original) The semiconductor assembly of claim 16 wherein the pressure control valve unit, flow rate sensor unit and flow rate control valve unit are respectively mounted adjacent each other on fluid openings on the housing block member including a pressure control valve seat and a flow rate control valve seat.

18. (Original) The semiconductor assembly of claim 15 further including a filter member mounted in the housing block member fluid passageway upstream of the pressure control valve unit.

19. (Currently Amended) A mass flow controller including a flow rate control valve and a flow rate sensor for regulating fluid flow, ~~characterized by~~ comprising:

a pressure control valve disposed ~~at an upstream~~ from side of the flow rate control valve,

a pressure sensor disposed between the pressure control valve and the flow rate control valve, the flow rate sensor and the pressure control valve arranged side-by-side, a passage disposed therebetween designed as short as possible, the pressure sensor disposed between the pressure control valve and the flow rate sensor, at a position as close to the flow rate sensor as possible, the flow rate sensor disposed between the pressure control valve and the flow rate control valve, and

a controller for controlling the pressure control valve in response to ~~by feeding back~~ an output of the pressure sensor to avoid an effect on the flow rate due to a pressure fluctuation at the inlet of the mass flow controller and for controlling the flow rate control valve in response to an output of the flow rate sensor to avoid an effect on the flow rate due to a pressure fluctuation at the outlet of the mass flow controller, ~~wherein the flow rate sensor is disposed between the pressure control valve and the flow rate control valve to enable the controller to regulate the fluid flow rate.~~

20.-21. (Cancelled)

22. (Original) The mass flow controller according to claim 19, wherein the pressure control valve, the flow rate sensor and the flow rate control valve are aligned at one side of a passage block.

23. (Original) The mass flow controller according to claim 19, wherein the pressure sensor is disposed at a side of the passage block, different from the side on which the pressure control valve, the flow rate sensor and the flow rate control valve are mounted.

24. (Currently Amended) The mass flow controller according to claim ~~[[20]]~~ 19, wherein the pressure control valve, the flow rate sensor and the flow rate control valve are aligned at one side of a passage block.

25. (Currently Amended) The mass flow controller according to claim ~~[[20]]~~ 19, wherein the pressure control valve, the flow rate sensor and the flow rate control valve are aligned at one side of a passage block.

26. (Currently Amended) The mass flow controller according to claim ~~[[20]]~~ 19, wherein the pressure sensor is disposed at a side of the passage block, different from the side on which the pressure control valve, the flow rate sensor and the flow rate control valve are mounted.

27. (Currently Amended) The mass flow controller according claim ~~[[21]]~~ 19, wherein the pressure sensor is disposed at a side of the passage block, different from the side on which the pressure control valve, the flow rate sensor and the flow rate control valve are mounted.

28. (Original) The mass flow controller according claim 22, wherein the pressure sensor is disposed at a side of the passage block, different from the side on which the pressure control valve, the flow rate sensor and the flow rate control valve are mounted.

29. (Original) The mass flow controller according to claim 22, wherein the passage block is are formed integrally as one unit.

30. (Original) The mass flow controller according to claim 23, wherein the passage block is formed integrally as one unit.

31. (New) The semiconductor system of claim 15, wherein the housing block member has the fluid passageway with openings to the passageway on an upper surface, the
5 openings including a first annular valve seat for operatively interfacing with a diaphragm member of the pressure control valve unit, a pair of ports for connection to the flow rate sensor unit and a second annular valve seat for operatively interfacing with a diaphragm member of the flow rate control valve and the openings to the fluid passageway are aligned in a row adjacent each other across the housing block member.

32. (New) In a semiconductor production assembly utilizing a source of fluid, the improvement of a mass flow controller module that can control fluid flow and be installed as a unitary component, comprising:

5 a housing block member having a fluid passageway connected to the source of fluid;

a pressure sensor unit operatively mounted in the fluid passageway, said pressure sensor unit providing a pressure signal; and

10 a mass flow controller module mounted on the housing block including, from an upstream position in a consecutive and adjacent arrangement, a pressure control valve unit, a flow rate sensor unit and a flow rate control valve unit, said flow rate sensor unit providing a flow rate signal, and said pressure sensor unit is operatively mounted in the fluid passageway in such close proximity to said flow rate sensor unit that measurement and adjustment of the pressure in said fluid passageway is kept substantially constant at the flow rate sensor unit; and

15 a control means for providing a first control signal to said pressure control valve unit in response to said pressure signal to avoid an effect on the flow rate in the fluid passageway due to a pressure fluctuation at the inlet of the mass flow controller, and for providing a second control signal to said flow rate control valve in response to said flow rate signal to avoid an effect on the flow rate in the fluid passageway due to a pressure fluctuation at the outlet of the mass flow controller

33. (New) The semiconductor assembly of claim 32 wherein a second pressure sensor unit is mounted between the pressure control valve and the flow rate sensor and is operatively connected to the control means.

34. (New) The semiconductor assembly of claim 33 wherein the pressure control valve unit, flow rate sensor unit and flow rate control valve unit are respectively mounted adjacent each other on fluid openings on the housing block member including a pressure control valve seat and a flow rate control valve seat.

35. (New) The semiconductor assembly of claim 32 wherein the housing block member has the fluid passageway with openings to the passageway on an upper surface, the openings including a first annular valve seat for operatively interfacing with a diaphragm member of the pressure control valve unit, a pair of ports for connection to the flow rate sensor
5 unit and a second annular valve seat for operatively interfacing with a diaphragm member of the flow rate control valve and the openings to the fluid passageway are aligned in a row adjacent each other across the housing block member.